Last updated: 23/04/2021 Curriculum Vitae

Ibrahem Elkamash

PERSONAL DATA

Full Name: Ibrahem Elsayed Elkamash.
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Current Address: Mansoura University, Faculty of Science, Physics department, 35516 Mansoura, Egypt.
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QUALIFICATIONS

- **PhD in Plasma Physics**: Queen's University Belfast, Belfast, United Kingdom;
  Awarded: 07 March 2019;
  Thesis title : "*Nonlinear Dynamics of Multicomponent Plasmas: Localized Modes, Expansion, Beam - Plasma Interaction Effects*";
  Thesis advisor: Ioannis Kourakis.
- **MSc. in Plasma Physics** : Mansoura University, Egypt, 2013; Thesis title: "*Similarity Solutions of Some Nonlinear Differential Equations*"; Thesis advisors: S.A.El-Wakil and A.M.Elhanbaly.
- **Diploma in Plasma Physics**; Mansoura University, Egypt, May 2010.
- **BSc. Project** : *Extraterrestrial solar radiation on Egypt*; Mansoura University, Egypt, 2008.
- **BSc. in Physics** (Honours degree): Awarded in May 2008, First class; Mansoura University, Egypt.

WORK EXPERIENCE

- Permanent Affiliation: Lecturer; Physics Department, Faculty of Science, Mansoura University, Egypt; years: Jun. 2019 - Today.
- Research Fellow funded by Engineering and Physical Sciences Research Council (EPSRC), Queen's University Belfast, Belfast, United Kingdom; years: Dec. 2018– Jun. 2019.
- PhD candidate, Queen's University Belfast, Belfast, United Kingdom; years: 2015-2019.
- Assistant Lecturer: Physics Department, Faculty of Science, Mansoura University, Egypt; years: 2013 - 2015.
- Demonstrator (Teaching Assistant): Physics Department, Faculty of Science, Mansoura University, Egypt: 2008 - 2013.

TEACHING EXPERIENCE

- Teaching of physics tutorials for undergraduate students at Mansoura University, Egypt: 2019 – Today.
- Teaching assistant of physics tutorials for undergraduate students at Queen's University Belfast, Belfast, United Kingdom, from 2015 until 2018.
- Teaching of physics tutorials, e.g. Electricity and Magnetism, Properties of Matter and Heat, Optics and Electromagnetic, including supervision of experimental labs, for Egyptian and international undergraduate students at Mansoura University, Mansoura, Egypt, from 2010 until 2015.
- Summer internship with Egyptian and international undergraduate students at Mansoura University, Mansoura, Egypt, from 2010 until 2015.

Awards and Fellowships

4. Egyptian Government International PhD Scholarschip, held in the UK, for the period 2015-2019; Project title: *Energy and Charge Transport by Localized Pulses in Renewable Energy Production Scheme: the case of Interial Confinement Fusion.*
3. Scientists Syndicate Honoring Certificate, Mansoura, El-Dakahlia, Egypt: 2014.
2. MSc. Scholarship, Physics Department, Mansoura University, Egypt: 2008 - 2013.
1. Mubarak Encouragement Award for Excellence and Success: 2005, 2006, 2007 and 2008.

Skills

- Language skills: Arabic; English.
- Computer skills: operating environment (ICDL).
- Analytical skills: advanced nonlinear mathematical methods in physics; multiscale processes; perturbation theory and phase-space analysis.
- Computational simulation skills: numerical integration algorithms of nonlinear PDEs; symbolic computing (Wolfram Mathematica, Maple) and numerical analysis (Matlab).

Professional Activities

- Supervision of M.Sc. students at Mansoura University, Mansoura, Egypt.
- Peer-Reviewer (referee) for scientific journals, including: Physics of Plasmas (AIP, USA), IEEE Transactions in Plasma Science (IEEE, USA), Physica Scripta (IoP, Swedish Academy)
- Supervision of M.Sc. students at Queen's University Belfast in UK together with Dr. Ioannis Kourakis.

Research Interests

My research interests cover a variety of topics within the field of theoretical plasma physics, and particularly on the plasma response to the external perturbations, investigating the physical mechanisms driving plasma particles, momentum and energy transport and the non-linear evolution stage of a perturbation in the plasma. The main focus points are summarized in the following:

- Electrostatic and electromagnetic waves in Space and laboratory plasmas: negative ion plasma (NIP), pair plasmas, e-p-i plasmas, two-electron temperature plasmas; laser-plasma interactions.
- Nonlinear excitations: solitons, double layers, shocks, and associated nonlinear instabilities, modulated envelope wave packets; modulational instability.
- Modeling of nonlinear wave propagation in dispersive media: nonlinearity, dispersion laws, forcing, dissipative and diffusion effects.
- Soliton Theory: stability, effect of perturbations, Korteweg de Vries (KdV) equation, Kadomtsev-Petviashvili (KP) equation, nonlinear Schrodinger (NLS), and associated partial differential equations.
- Studying the topology of the phase plane and potential diagrams (bifurcation analysis) of partial differential equations in order to recognize different types of solutions and their stability.
- Investigating extreme events (freak waves, rogue waves) and modulated structures (envelope solitons), in particular, focusing on how their properties arise from fluid models for beam-plasma interactions. Electrostatic waves in ultra-high density (quantum) plasmas, in Space plasmas and in non-Maxwellian plasmas, in particular, are the principal axes of my current research. Relying on multiple-scale techniques, applied to fluid models, I model the formation of nonlinear waves (solitary waves, shocks) in multicomponent plasmas and investigate their structural and dynamical properties.
- Plasma expansion: self-similar/plume expansion and the associated particle acceleration in Laser-Plasma interaction.

PUBLICATIONS

I have **14** refereed articles and**7** Conference Proceedings papers:

- *Refereed journals*:

14. *Electrostatic wave breaking limit in a cold electronegative plasma with non-Maxwellian electrons*
I. S. Elkamash and I. Kourakis, Scientific Reports **11**, 6174 (2021).

13. *Evolution of ion-acoustic soliton waves in Venus's ionosphere permeated by the solar wind*
M. S. Afify, I. S. Elkamash, M Shihab, W. M. Moslem, Accepted in Advances in Space Research, (2021).

12. *The effect of -distributed trapped electrons on fully nonlinear electrostatic solitary waves in an electron-positron-relativistic ion plasma*
I. S. Elkamash A. M. El-Hanbaly, J. Phys. A: Math. Theor. **54**, 065701 (2021).

11. *Electrostatic solitary structures in warm multi-ion dusty plasmas: The effect of an external magnetic field and nonthermal electrons*
I. S. Elkamash, Phys. Plasmas **27**, 022112 (2020).

10. *Modelling of high frequency envelope modes in a κ - nonthermal collisional plasma*,
S. Sultana, R. Schlickeiser, I. S. Elkamash and I. Kourakis, Phys. Rev. E **98**, 033207 (2018).

9. *Coexistence of negative and positive polarity electrostatic solitary waves in ultradense relativistic negative-ion-beam permeated plasmas*
I. S. Elkamash and I. Kourakis, Phys. Plasmas **25**, 052124 (2018).

8. *Electrostatic shock structures in dissipative multi-ion dusty plasmas*
I. S. Elkamash and I. Kourakis, Phys. Plasmas **25**, 062104 (2018).

7. *Ion-beam plasma interaction effects on electrostatic solitary wave propagation in ultradense relativistic quantum plasmas*
I. S. Elkamash, I. Kourakis and F. Haas, Phys. Rev. E **91**, 033102 (2017).

6. *Ion-beam plasma modes in ultradense relativistic quantum plasmas: Dispersion characteristics and beam-driven instability*
I. S. Elkamash, F. Haas, and I. Kourakis, Phys. Plasmas **24**, 092119 (2017).

5. *New insight into the dispersion characteristics of electrostatic waves in ultradense plasmas: electron degeneracy and relativistic effects*
I. Kourakis, M. McKerr, I. S. Elkamash, and F. Haas, Plasma Phys. Control. Fusion **59**, 105013 (2017).

4. *Multispecies plasma expansion into vacuum: The role of secondary ions and suprathermal electrons*
I. S. Elkamash and I. Kourakis, Phys. Rev. E **94**, 053202 (2016).

3. *Comment on Weakly dissipative dust-ion acoustic wave modulation (J. Plasma Phys. 82, 905820104, 2016)*
I. Kourakis and I. S. Elkamash, J. Plasma Phys. **82**, 905820508 (2016).

2. *Electron acoustic soliton energy of the Kadomtsev-Petviashvili equation in the Earths magnetotail region at critical ion density*,
S.A.El-Wakil, A.M.El-hanbaly, E.K.El-Shewy, I.S.Elkamash, Astrophysics and Space Science, springer **349**, 197 (2014).

1. *Symmetries and exact solutions of KP equation with an arbitrary nonlinear term*,
S.A.El-Wakil, A.M.El-hanbaly, E.K.El-Shewy, I.S.Elkamash, Journal of Theoretical and Applied Physics **8**, 93 (2014).

- *Conference Proceedings*:

7. *On the interaction of a negative-ion beam with ultradense plasma: linear beam-plasma instability and electrostatic soliton characteristics*
I. S. Elkamash and I. Kourakis, Proc.44^{th} *EPS Conference on Plasma Physics*; paper **O4.413** in *Europhysics Conference Abstracts* Vol.**41**F (ISBN: 979-10-96389-07), 2017.

6. *Of electrostatic envelope modes and freak wave modeling in plasmas: revisiting a widespread fallacy* Ioannis Kourakis, Omar Bouzit and Ibrahem S. Elkamash, Proc. 44^{th} *EPS Conference on Plasma Physics*; paper **P1.403** in *Europhysics Conference Abstracts* Vol.**41**F (ISBN: 979-10-96389-07), 2017.
5. *Modelling electrostatic solitary waves in positron-laden plasmas: shedding new light on an old problem* V. McMullan, I. S. Elkamash, and I. Kourakis, Proc. 44^{th} *EPS Conference on Plasma Physics*; paper **P2.406** in *Europhysics Conference Abstracts* Vol.**41**F (ISBN: 979-10-96389-07), 2017.
4. *Modulational Instability of LangmuirWavepackets in Collisional Plasmas* J. B. Cook, I. S. Elkamash, and I. Kourakis, Proc. 44^{th} *EPS Conference on Plasma Physics*; paper **P5.403** in *Europhysics Conference Abstracts* Vol.**41**F (ISBN: 979-10-96389-07), 2017.
3. *Multi-ion plasma expansion in the presence of suprathermal electrons* I. S. Elkamash and I. Kourakis, Proc. 43^{rd} *EPS Conference on Plasma Physics*; paper **P4.082** in *Europhysics Conference Abstracts* Vol.**40**A (ISBN: 2-914771-99-1), 2016.
2. *Analytical model for dissipative shocks in pair plasmas under the combined effect of collisionality and kinematic viscosity* I. S. Elkamash and I. KourakisProc. 43^{rd} *EPS Conference on Plasma Physics*; paper **P5.097** in *Europhysics Conference Abstracts* Vol.**40**A (ISBN: 2-914771-99-1), 2016.
1. *Freak Waves and Modulational Dynamics in Plasmas with Negative Ions* I. S. El-Kamash, B. Reville and I. Kourakis, Proc. 42^{nd} *EPS Conference on Plasma Physics*; paper **P5.407** in *Europhysics Conference Abstracts* Vol.**39**E (ISBN: 2-914771-98-3), 2015.

Contributed Presentations

I have presented **2** oral talks and **9** posters in 8 international conferences, in years: 2015-2018:

- *Oral Talks*:
  2. *Electrostatic shock waves in multicomponent plasmas: viscosity, collisionality and negative ion effects* 8^{th} *Int. Conf. Phys. Dusty Plasmas* in Prague, Czech Republic; 20 - 25 May 2017.
  1. *Ion-beam/plasma interaction effects on solitary wave propagation in relativistic quantum plasmas* 44^{th} *EPS Conference on Plasma Physics* in Belfast, UK; 26 - 30 June 2017.
- *Posters*:
  10. *MULTI-DIMENSIONAL LOCALIZED STRUCTURES IN DUST-LADEN NONTHERMAL PLASMAS: OVERVIEW OF RECENT RESULTS* 43^{rd} *COSPAR Scientific Assembly* in Sydney, Australia; 15-22 August 2020.
  9. *Self-similar plasma expansion dynamics: the role of secondary ions and nonthermal electrons* 42^{nd} *COSPAR Scientific Assembly* in Pasadena, CA, United States of America; 14 - 22 July 2018.
  8. *Shock dynamics in multi-ion dusty plasmas: theory versus simulations* 42^{nd} *COSPAR Scientific Assembly* in Pasadena, CA, United States of America; 14 - 22 July 2018.
  7. *Electrostatic shock to pulse transition in multispecies plasmas* 45^{th} *IoP Plasma Physics conference* in Belfast, UK; 9 - 12 April 2018.
  6. *On the effect of plasma composition and highly energetic electrons on plasma expansion into vacuum* 45^{th} *IoP Plasma Physics conference* in Belfast, UK; 9 - 12 April 2018.
  5. *Multi-species plasma expansion into vacuum: the role of secondary ions and energetic electrons* *2017 CLF Christmas Meeting of the High Power Laser Science Community* in Abingdon, UK; 18 - 20 December 2017.
  4. *Multi-species plasma expansion into vacuum: the role of energetic electrons* 43^{rd} *EPS Conference on Plasma Physics* in Leuven, Belgium; 4 - 8 July 2016.

3. *Ion acoustic shock waves in a doped pair ion plasmas*
   43^{rd} *EPS Conference on Plasma Physics* in Leuven, Belgium; 4 - 8 July 2016.
2. *Multicomponent plasma expansion into vacuum with non-Maxwellian electrons*
   43^{rd} *IoP Plasma Physics conference* in Isle of Skye, UK; 23 - 26 May 2016.
1. *Ion Acoustic Envelope Solitons and Freak Waves in Multi-ion Plasmas*
   42^{nd} *EPS Conference on Plasma Physics* in Lisbon, Portugal; 22 - 26 July 2015.

Conferences & Workshops

I have attended

11. The 42^{nd} *COSPAR Scientific Assembly* in Pasadena, CA, United States of America; 14 - 22 July 2018.
10. The 45^{th} *IoP Plasma Physics conference* in Belfast, UK; 9 - 12 April 2017.
9. The 2017 *CLF Christmas Meeting of the High Power Laser Science Community* in Abingdon, UK; 18 - 20 December 2017.
8. The 44^{th} *EPS Conference on Plasma Physics* in Belfast, UK; 26 - 30 June 2017.
7. The 8^{th} *Int. Conf. Phys. Dusty Plasmas* in Prague, Czech Republic; 20 - 25 May 2017.
6. The 2016 *Leadership Summer School* in Queen's University Belfast, Belfats, UK; 26 - 28 July 2016.
5. The 43^{rd} *EPS Conference on Plasma Physics* in Leuven, Belgium; 4 - 8 July 2016.
4. The 43^{rd} *IoP Plasma Physics conference* in Isle of Skye, UK; 23 - 26 May 2016.
3. The 2016 *EPOCH Workshop* in (University of Warwick, Coventry, UK; 18 - 20 April 2016.
2. The 42^{nd} *EPS Conference on Plasma Physics* in Lisbon, Portugal; 22 - 26 July 2015.
1. The 2015 *workshop on CMS: Web Authoring: Introduction to CMS* in Queen's University Belfast, Belfats, UK; 21 Jul. 2015.

Research Visits

2. Institute of Theoretical Physics, UNESP State University of Sao Paulo, Brazil (date: 16/11 - 10/12/2017); hosted by Professor Roberto Kraenkel.
1. Universidade Federal do Rio Grande do Sul - UFRGS, Porto Alegre, Brazil (date: 21/09 - 21/10/2016 and 07 - 16/11/2017); hosted by Dr. Fernando Haas.